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Theory of the plane copper nuclear spin-lattice relaxation in La2-xSrxCuO4 and YBa2Cu3O7-y

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Abstract

Within the framework of the t-J model, a microscopical theory of the copper spin-lattice relaxation in the normal state of the superconductors La2-xSrxCuO4 and YBa2Cu3O7-y compounds is presented. The main contribution to the relaxation rate arises from strong short-range antiferromagnetic correlations between copper spins. The theory is able to reproduce the main features of both the doping and the temperature dependence of the copper relaxation rate as observed experimentally. The results for the doping dependence of both the spin-spin correlation function and the width of the conducting band are in agreement with Monte Carlo and exact diagonalization calculations within the t-J model.